

REMARKS

Claims 1-12 are pending in the application and are at issue. The amendments to claims 1 and 3 clarify the claims.

The present invention is directed to a process for reducing the residual monomer content and enhancing the wet strength of articles formed from a water-absorbent crosslinked polymer foam. The polymer foam contains units derived from monoethylenically unsaturated acids (e.g., acrylic acid). The process involves applying a polymer containing primary or secondary amino groups, e.g., polyvinylamine, having a molecular mass of at least 300 to the polymer foam.

Applicants note the examiner's comments concerning the term "treatment" in claim 1. The specification defines the term "treatment" at page 11, lines 8-27. To make the claim more clear, however, claim 1 has been amended to recite that the amino-containing polymer is applied to the polymer foam. This amendment is supported by the specification at page 11 and in Examples 1-4 at page 25-29. Claim 3 has been amended to delete the phrase "and/or ammonium," which cannot occur in an amino-containing polymer.

Claims 1-12 stand rejected under 35 U.S.C. §103 as being obvious over Saija et al. U.S. Patent Publication 2004/0046151 ('151) in view of Wallajapet U.S. Patent No. 5,948,829 ('829). The examiner bases these rejections on a treatment of paper using a functional siloxane and an initiator salt having an ammonium ion, and the reduction of residual monomer using a redox pair

including an *ammonium* ion, for example. It is submitted that this rejection is in error and should be withdrawn.

First, the '151 publication is directed to aqueous dispersions of polymers for treating glass fibers or textile fibers as opposed to *foams*. For the preparation of the dispersions, the '151 publication discloses using initiator systems and surfactants, and when used in the form of salts, preferred salts are ammonium salts (paragraph [0044]).

Also, and importantly, the '151 publication fails to teach or suggest any treatment with a polymer having primary and/or secondary amino groups. The '151 publication merely teaches using an *ammonium* persulfate initiator. This ammonium ion (NH_4^+) is substantially different from a *polymer* containing a primary and/or secondary amino group, i.e., $-\text{NH}_2$ or $-\text{NHR}$. The primary and secondary amino groups are covalently bound to the polymer, and are not monomeric like NH_4^+ . In addition, the ammonium containing initiator of the '151 publication is used *prior* to polymerization and does not function to reduce the residual monomer content *after* polymerization.

Furthermore, the '151 publication discloses *only* ammonium salts. Ammonia (or ammonium) is not a primary or secondary amine. Therefore, U.S. Publication No. 2004/0046151 does not disclose the use of polymers containing primary and/or secondary amino groups. Primary amines must have one substituent other than hydrogen and secondary amines must have two substituents other than hydrogen.

The examiner also points to a redox pair used after polymerization to reduce residual monomer content.

Again, the '151 publication merely teaches using a redox pair that does not release formaldehyde, and possibly having an *ammonium* ion, e.g., ammonium hydrogen sulfite. Like the initiator discussed above, such a redox pair is *different* from a *polymer* having *primary* and/or *secondary* amino groups. Furthermore, the ammonium cation of the redox pair is inert, and does not act to reduce residual monomer content. The sulfite portion of the compound is the active agent. The '151 publication also absolutely fails to teach reducing residual monomer content, or improved the wet strength of a *foam*, let alone both, using an amino-group containing *polymer*.

The '151 publication teachings are limited to disclosing a polymerization initiator and/or a redox pair possibly containing an ammonium ion. In each instance, the ammonium ion is neither the active initiator nor the agent that reduces residual monomer, i.e., an alkali metal can be substituted for ammonium (see '151 publication, column 2, paragraph [0029]). In addition, the '151 publication absolutely fails to mention an amino-containing *polymer* for any use, let alone to increase wet strength and reduce residual monomer content of a foam. The '151 publication also is directed to aqueous dispersion of polymers rather than a polymeric foam, and it is the *dispersed polymer* that improves the wet strength of glass and textile fiber. In contrast, the present claims are directed to enhancing the wet strength of a polymeric *foam* with an amino-containing polymer.

Persons skilled in the art would not have been motivated from the '151 publication, which is directed to aqueous dispersions, to first apply the teachings therein

to polymer foams, then alter the '151 teachings and utilize an amino-containing polymer to reduce residual monomer content and increase wet strength of the foam. The differences between the disclosed ammonium ion and the claimed amino-containing polymer are so great as to features, such as chemical identity and function, that a person skilled in the art would have had no incentive to substitute one for the other with any reasonable expectation of achieving a same end result.

The '829 patent does not overcome the deficiencies of the '151 publication. The '829 patent discloses a process for preparing absorbent foams (column 1, lines 6 and 7). The foams can be prepared by foaming a solution gel of a crosslinked polymer and freeze drying (column 2, lines 56 to 62). The '829 patent fails to disclose any method of reducing residual monomer content or the use of an amino-containing polymer. The '829 patent merely teaches a method of preparing a polymer foam, wherein the foamed polymer may, or may not, contain amino groups. The '829 patent, however, fails to teach or suggest the *addition* of an amino-containing polymer to a foam polymer.

In summary, for all the reasons set forth above, it is submitted that the '151 publication and '829 patent, alone or in combination, fail to render the claims 1-12 obvious under 35 U.S.C. §103, and this rejection should be withdrawn.

Claims 1-12 stand rejected under 35 U.S.C. §103 as being obvious over Peterson U.S. Patent No. 4,147,845 ('845) in view of the '151 publication and the '829 patent. The examiner bases the rejection on a disclosure

that residual monomer content of expandable thermoplastic beads is reduced using a water-soluble initiator that can have an ammonium cation. Applicants traverse this rejection.

The '845 patent disclosure is substantially different from the presently claimed invention, and, therefore, cannot render the present claims obvious. First, the '845 patent is directed to reducing the monomer content in expandable thermoplastic beads, such as polyvinylidene-acrylonitrile, polystyrene, or styrene-acrylonitrile beads. The present claims are directed to "foams containing units derived from monoethylenically unsaturated acids," as recited in claim 1. The '845 fails to teach or suggest (a) foams or (b) a polymer derived from monoethylenically unsaturated acids, e.g., acrylic acid.

The '845 patent further discloses a reduction in residual monomer content by warming a slurry of the beads in water in the presence of a water-soluble initiator ('845 patent, column 2, lines 39-47). The water-soluble initiator can be an inorganic, free radical initiator, such as *ammonium* persulfate. As stated above, the ammonium component (i.e., NH_4^+) of this compound is *inert*. The '845 patent fails to even mention an amino-containing *polymer*, let alone use of an amino-containing *polymer* to reduce residual monomer of a polymer foam. Finally, the '845 patent merely teaches the reduction of residual monomer from thermoplastic beads. Additionally, the '845 patent fails to teach, or even remotely address, an enhancement of the wet strength of an article formed from a polymeric foam. Therefore, the '845 patent

teaches no more than the ammonium ions of the '151 publication, and the present claims are not rendered obvious over the '845 patent for the same reasons that the present claims are patentable over the '151 publication.

The differences between the '845 patent and the present claims are so substantial that claims 1-12 would not have been obvious over the '845 patent, i.e., beads versus a foam, a difference in the identity of the polymer, use of an inert *ammonium ion* rather than an *amino-containing polymer*, and a failure to disclose enhancing the wet strength of a foam. Persons skilled in the art simply would not have had any motivation or incentive to make the drastic changes required after reading the '845 patent to arrive at the present invention.

The '151 publication and '829 patent do not overcome the deficiencies of the '845 patent. As discussed above, the '151 publication is limited to teaching initiators and/or redox pairs having an inert ammonium cation. Not only is an ammonium ion unrelated to an amino-containing polymer, the ammonium ion is not even the active component of the initiator or redox pair, e.g., an alkali metal ion can be substituted for the ammonium ion with no loss of activity. The ammonium ion is merely a counterion to provide water solubility.

Furthermore, the '151 publication is not directed to enhancing the wet strength of a *foam*. The '151 publication is directed to a polymer applied to glass fibers or textiles to impart enhanced properties to the fibers. This is different from the present invention in which the polymeric foam has its properties enhanced. In addition, the silane monomers referred to by the examiner

are different from the claimed monomers that make up the foam. The '151 publication uses the silane-based polymer to enhance the properties of fibers. In contrast, the present invention utilizes an amino-containing polymer to enhance the wet strength properties of a polymer foam.

The '829 patent merely discloses a method of preparing a polymeric foam, and fails to teach or suggest removing residual monomer from the foam and increasing wet strength, let alone by using an amino-containing polymer.

For the above reasons, and for the reasons set forth above with respect to the patentability of the claims over the '151 publication and '829 patent, the present claims would not have been obvious over a combination of the '845 patent, '829 patent, and the '151 publication. Persons skilled in the art would have had no motivation to substitute an amino-containing polymer to reduce the residual monomer content of a polymer foam. The differences between an ammonium ion and an amino-containing polymer, as disclosed in the cited art and in the present claims, are so great that the substitutions and correlations suggested by the examiner simply would not reasonably be considered by persons skilled in the art.

Accordingly, it is submitted that claims 1-12 are patentable over a combination of the '845 patent, the '151 publication, and the '829 patent, and that the rejection under 35 U.S.C. §103 should be withdrawn.

Claims 9-12 stand rejected under 35 U.S.C. §103 as being obvious over the '151 publication in view of the '829 patent. It is submitted that this rejection should

be withdrawn for the same reasons set forth above with respect to the 35 U.S.C. §103 rejection of claims 1-12 over the '151 publication in view of the '829 patent.

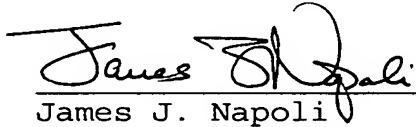
In summary, it is submitted that the claims are in proper form and scope for allowance. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

Respectfully submitted,

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A handwritten signature in dark ink, appearing to read "James J. Napoli", is written over a horizontal line.

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